	Application No.	Applicant(s)
Notice of Allowability	10/772,643	STAGER ET AL.
	Examiner	Art Unit	
	Farhan M. Syed	2165	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address--*
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *11/8/07*.

2. ☒ The allowed claim(s) is/are *1,3-18,20,21,23,25,26 and 28-38*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
    Paper No./Mail Date _____ .

  Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)
1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO/SB/08),
    Paper No./Mail Date (See Office Action)

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413),
    Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

/FMS

DETAILED ACTION

1.   Claims 1, 3-18, 20, 21, 23, 25, 26, and 28-38 are pending.

2.   Applicant's amendments and arguments filed on 08 November 2007 have been

fully considered and they are deemed to be persuasive.

Information Disclosure Statement

3.   The information disclosure statements (IDS) submitted on 10 August 2007 and

17 December 2007 are being considered by the examiner.

EXAMINER'S AMENDMENT

4.   Authorization for Examiner's Amendment to the amendment filed 08 November

2007 was given by Steven Gellman (Reg. No. 41,034) in a telephone interview on 07

February 2007.

5.   An examiner's amendment to the amendment filed 08 November 2007 appears

below. Should the changes and/or additions be unacceptable to applicant, an

amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of

such an amendment, it MUST be submitted no later than the payment of the issue fee.

6.   The application has been amended as follows:

1. (Currently Amended) A method for providing continuous data protection, the

method comprising the steps of:

writing data to a primary volume;

duplicating the writes made to the primary volume to a second volume in a

sequential fashion, wherein the secondary volume contains a chronological

ordering of all writes made to the primary volume; and

identifying any point in time (APTI) window wherein all writes to the secondary

volume are maintained so that within the identified APIT window, the primary

volume may be restored to any previous point within the APIT window;

creating a block-ordered mapping data structure to track changes in the data

written to the secondary volume between two points in time; and

merging the mapping data structure that protect contiguous points in time,

whereby fewer mapping data structures are needed to protect the data between

the same two points in time spanning the merged mapping data structures.

10. (Currently Amended) A method for operating a data protection system for a

protected computer system, the method comprising the steps of:

tracking writes made to a primary volume;

duplicating the writes to the primary volume in a sequential fashion on a

secondary volume, wherein the secondary volume contains a chronological

ordering of all writes made to the primary volume;

organizing a mapping of the writes between the primary volume and the

secondary volume into a block-ordered data structures, wherein the data

structures enable the primary volume to be restored at any point in time;

identifying any point in time window wherein the data structures are maintained so that within the identified time window, the primary volume may be restored at any point within the time window; and

merging the data structures that protect contiguous points in time, whereby fewer data structures are needed to protect the data between the same two points in time spanning the merged data structures.

14. (Currently amended) A system for providing continuous data protection, the system comprising:

a host computer;

a primary volume for storing data written by the host computer;

a secondary volume wherein writes made to the primary volume are sequentially duplicated onto the secondary volume, the secondary volume containing a chronological ordering of all writes made to the primary volume; and

a data protection system configured to:

manage the duplication of writes to the secondary volume;

map data between the primary volume and the secondary volume using a block-ordered data structures, wherein the data structures are maintained so that within an established time window, the primary volume may be restored to any point within the time window; and

merge <u>the</u> data structures that protect contiguous points in time, whereby fewer

data structures are needed to protect the data between the same two points in

time spanning the merged data structures.

20. (Currently Amended) A computer-readable storage medium containing a set

of instructions for a general purpose computer, the set of instructions comprising:

a tracking code segment for tracking writes made to a primary volume;

a duplicating code segment for duplicating the writes to the primary volume in a

sequential fashion on a secondary volume, wherein the secondary volume

contains a chronological ordering of all writes made to the primary volume;

an organizing code segment for organizing a mapping of the writes between the

primary volume and the secondary volume into <u>a block-ordered</u> data structures,

wherein the data structures enable the primary volume to be restored to any

point in time;

an identifying code segment for identifying any point in time window wherein the

data structures are maintained so that within the identified time window, the

primary volume may be restored to any point within the time window; and

a merging code segment for merging <u>the</u> data structures that protect contiguous

points in time, whereby fewer data structures are needed to protect the data

between the same two points in time spanning the merged data structures.

21. (Currently Amended) A method for enabling data recovery from a primary

volume in a contiguous data protection system, comprising the steps of:

creating an initial copy of the primary volume;

after the initial copy is made, duplicating each write to the primary volume to a

write log to be stored on a secondary volume, the write log being written to the

secondary volume when the write log is full, wherein the secondary volume

contains a chronological ordering of all writes made to the primary volume;

creating a snapshot of the primary volume, the snapshot being a point in time to

which the primary volume can be stored;

creating a block-ordered data structure to track the writes made to the secondary

volume, the data structure being derived from the write log and containing the

writes made to the primary volume between two points in time; and

merging the data structures that protect contiguous points in time, whereby fewer

data structures are needed to protect the data between the same two points in

time spanning the merged data structures.

35. (Currently Amended) A currently implemented method for continuously

protecting data stored on a volume of a storage system, comprising:

writing data to a primary volume in a block-based order;

duplicating the data to a write log in a sequential order;

creating a block-ordered mapping data structure from the write log, the block-

ordered mapping data structure stored on a secondary volume and used to track

changed in the data between two points in time, whereby the data is continuously

protected; and merging the mapping data structure that protect contiguous points

in time, whereby fewer mapping data structure are needed to protect the data

between the same two points in time spanning the merged mapping data

structures.

Allowable Subject Matter

7.   Claims 1, 3-18, 20, 21, 23, 25, 26, and 28-38 and renumbered 1-33 are allowed

over the prior art of record.

Reasons For Allowance

8.   The following is an examiner's statement of reasons for allowance:

9.   Regarding independent claims 1, 10, 14, 20, 21 and 35, Applicants particular

methods, associated systems, and associated article of manufacture of providing

continuous data protection comprising: creating a block-ordered mapping data structure

to track changes in the data written to the secondary volume between two points in

time; and merging the mapping data structure that protect contiguous points in time,

whereby fewer mapping data structures are needed to protect the data between the

same two points in time spanning the merged mapping data structures, was not

disclosed by, would not have been obvious over, nor would have been fairly suggested

by the prior art of record. The closest prior art Kedem (U.S. Patent 6,725,331) teaches

writing data to a primary volume; duplicating the writes made to the primary volume to a

secondary volume in a sequential fashion, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume; and identifying an any point in time (APIT) window wherein all writes to the secondary volume are maintained so that within the identified APIT window, the primary volume may be restored to any point within the APIT window. Other relevant prior art teaches the general concept of providing continuous data protection: McCabe, Ron et al (U.S. Patent Pub. 2002/0016827), Stager, Roger et al (U.S. Patent Pub. 2005/0193272), and Stager, Roger et al (U.S. Patent Pub. 2005/0171979)

The dependent claims, being further limiting to the independent claims, definite and enabled by the specification are also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farhan M. Syed whose telephone number is 571-272-7191. The examiner can normally be reached on 8:30AM-5:00 PM.
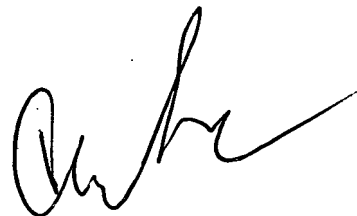
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christian Chace can be reached on 571-272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/FMS

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